

1 **CLAIMS**

2 What is claimed is

3  
4 1. A method for use in encoding video data, the method comprising:  
5 within a sequence of video pictures, selecting a current video picture to be  
6 encoded;  
7 dividing the current video picture into portions and selecting a current  
8 portion to be encoded;  
9 establishing at least a first reference picture for said current portion; and  
10 selectively assigning at least one motion vector predictor (MVP) to said  
11 current portion, said MVP including data associated with at least said first  
12 reference picture and with at least one other encoded portion of said current video  
13 picture, and wherein said MVP is not based on a temporal interpolation of motion  
14 vectors used for encoding said first reference picture.

15  
16 2. The method as recited in Claim 1, further comprising:  
17 establishing at least a second reference picture for said current portion; and  
18 wherein said MVP further includes data associated with said second  
19 reference picture, and said MVP is not based on a temporal interpolation of motion  
20 vectors used for encoding said second reference picture.

21  
22 3. The method as recited in Claim 1, wherein said first reference  
23 picture either temporally precedes or temporally follows said current video picture  
24 in said sequence of video pictures.  
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1           4.     The method as recited in Claim 2, wherein said second reference  
2 picture either temporally precedes or temporally follows said current video picture  
3 in said sequence of video pictures.

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5           5.     The method as recited in Claim 2, wherein said first and second  
6 reference picture both either temporally precede or temporally follow said current  
7 video picture in said sequence of video pictures.

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9           6.     The method as recited in Claim 2, wherein said first reference  
10 picture either temporally precedes or temporally follows said second reference  
11 picture in said sequence of video pictures.

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13          7.     The method as recited in Claim 2, wherein said second reference  
14 picture either temporally precedes or temporally follows said first reference  
15 picture in said sequence of video pictures.

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17          8.     The method as recited in Claim 1, wherein said sequence of video  
18 pictures includes interlaced pictures.

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20          9.     The method as recited in Claim 1, wherein said at least one other  
21 encoded portion of said current video picture is a spatially neighboring portion  
22 within said current video picture.

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24          10.    The method as recited in Claim 2, wherein selectively assigning said  
25 MVP to said current portion further includes:

1 selectively assigning at least one motion parameter to said current portion,  
2 said motion parameter based on spatial prediction using at least one collocated  
3 portion within at least one of said first and second reference pictures.

4  
5 11. The method as recited in Claim 10, wherein said collocated portion  
6 is intra coded.

7  
8 12. The method as recited in Claim 10, wherein said collocated portion  
9 is encoded based on a different reference picture than said corresponding portion.

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11 13. The method as recited in Claim 10, wherein said MVP is based on at  
12 least one motion parameter of at least one portion adjacent to said current portion  
13 within said current video picture.

14  
15 14. The method as recited in Claim 10, wherein said MVP is used  
16 without alteration to form said motion parameter of at least one sample in a  
17 corresponding current video frame.

18  
19 15. The method as recited in Claim 10, wherein said MVP is used without  
20 alteration to form said motion parameter of at least one sample in a corresponding  
21 current video field.

22  
23 16. The method as recited in Claim 10, wherein said MVP is used as a  
24 prediction to which is added a coded motion vector difference to form said motion  
25 parameter of at least one sample in a corresponding current video frame.

1  
2 17. The method as recited in Claim 10, wherein said MVP is used as a  
3 prediction to which is added a coded motion vector difference to form said motion  
4 parameter of at least one sample in a corresponding current video field.  
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6 18. The method as recited in Claim 13, wherein said motion parameter  
7 includes a motion vector set to zero when said collocated portion is substantially  
8 temporally stationary.  
9

10 19. The method as recited in Claim 18, wherein a size of said collocated  
11 portion is one unit of motion vector value.  
12

13 20. The method as recited in Claim 19, wherein said one unit of motion  
14 vector value is one quarter-sample unit in as used in encoding said reference  
15 picture of said collocated portion.  
16

17 21. The method as recited in Claim 1, further comprising:  
18 encoding said current portion using a Direct Mode scheme resulting in a  
19 Direct Mode coded current portion;  
20 encoding said current portion using a Skip Mode scheme resulting in a Skip  
21 Mode coded current portion; and  
22 selecting between said Direct Mode coded current picture and said Skip  
23 Mode coded current picture.  
24  
25

1           22.    The method as recited in Claim 1, wherein selectively assigning said  
2 MVP to said current portion further includes:

3           encoding said current portion using a Copy Mode scheme based on a spatial  
4 prediction technique to produce a Copy Mode coded current portion;

5           encoding said current portion using a Direct Mode scheme based on a  
6 temporal prediction technique to produce a Direct Mode coded current portion;  
7 and

8           selecting between said Copy Mode coded current portion and said Direct  
9 Mode coded current portion.

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11           23.    The method as recited in Claim 22, wherein selecting between said  
12 Copy Mode coded current portion and said Direct Mode coded current portion is  
13 accomplished using a Rate Distortion Optimization (RDO) technique.

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15           24.    The method as recited in Claim 23, wherein said RDO technique  
16 uses a Lagrangian parameter  $\lambda$  based on a quantizer ( $QP$ ) associated with said  
17 current portion, and wherein said RDO technique employs an adaptive weighting  
18 function.

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20           25.    The method as recited in Claim 24, wherein said adaptive weighting  
21 function includes:

22           
$$f(QP) = \max\left(2, \min\left(4, \frac{QP}{6}\right)\right).$$
  
23  
24  
25

1           26.    The method as recited in Claim 23, wherein selecting between said  
2 Copy Mode coded current portion and said Direct Mode coded current portion is  
3 accomplished at least in-part based on user input.  
4

5           27.    The method as recited in Claim 10, wherein said MVP is based on  
6 linear prediction.  
7

8           28.    The method as recited in Claim 10, wherein said MVP is based on  
9 non-linear prediction.  
10

11          29.    The method as recited in Claim 10, wherein said MVP is based on  
12 median prediction.  
13

14          30.    The method as recited in Claim 10, wherein said motion parameter  
15 includes a Direct Mode motion parameter.  
16

17          31.    The method as recited in Claim 1, wherein said current portion is  
18 selected from a group of different types of portions comprising a picture, a block,  
19 a macroblock, a subblock, a sub-partition, a slice.  
20

21          32.    The method as recited in Claim 1, wherein said current picture is  
22 encoded as at least one picture selected from a group of pictures comprising a B  
23 picture and a P picture.  
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1           33. The method as recited in Claim 2, wherein said first and second  
2 reference pictures are each encoded as P pictures or B pictures.

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4           34. The method as recited in Claim 1, wherein a syntax associated with  
5 said current picture identifies that said current picture was encoded using said  
6 MVP.

7  
8           35. The method as recited in Claim 1, wherein a syntax associated with  
9 said current picture includes at least one parameter selected from a group of  
10 parameters comprising a copy\_mv\_spatial parameter, a direct\_mv\_spatial  
11 parameter, and a direct\_mv\_scale\_div\_diff.

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13           36. The method as recited in Claim 34, wherein said syntax includes a  
14 header selected from among a group of headers comprising a frame header, a  
15 macroblock header and a slice header.

16  
17           37. The method as recited in Claim 36, wherein said syntax includes at  
18 least one flag indicative of a type of direct mode encoding used.

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20           38. The method as recited in Claim 36, wherein said type of direct mode  
21 encoding used is selected from a group comprising temporal direct mode and  
22 spatial direct mode.

1           39. A computer-readable medium having computer-implementable  
2 instructions for causing at least one processing unit to perform acts comprising:

3           encoding video data by, within a sequence of video pictures, selecting a  
4 current video picture to be encoded, dividing the current video picture into  
5 portions and selecting a current portion to be encoded, and establishing at least a  
6 first reference picture for said current portion; and

7           outputting at least one motion vector predictor (MVP) for said current  
8 portion, said MVP including data associated with at least said first reference  
9 picture and with at least one other encoded portion of said current video picture,  
10 and wherein said MVP is not based on a temporal interpolation of motion vectors  
11 used for encoding said first reference picture.

12  
13           40. An apparatus for use in encoding video data, the apparatus  
14 comprising:

15           logic operatively configured to select a current video picture to be encoded  
16 from a sequence of video pictures, divide the current video picture into a plurality  
17 of portions, select a current portion to be encoded, select at least a first reference  
18 picture from within said sequence of video pictures for said current portion, and  
19 determine at least one motion vector predictor (MVP) for said current portion,

20           wherein said MVP includes data associated with at least said first reference  
21 picture and with at least one other encoded portion of said current video picture,  
22 and wherein said MVP is not based on a temporal interpolation of motion vectors  
23 used for encoding said first reference picture.



1           41.    A method comprising:

2            decoding at least one encoded current portion of a current video within a  
3   sequence of video pictures based on at least one motion vector predictor (MVP)  
4   associated with said current portion, said MVP comprising data associated with at  
5   least a first reference picture within said sequence of video pictures and also with  
6   at least one other encoded portion of said current video picture, and

7            wherein said MVP is not based on a temporal interpolation of motion  
8   vectors used for encoding said first reference picture.

9  
10          42.    The method as recited in Claim 41, wherein said at least one MVP is  
11   further associated with at least a second reference picture within said sequence of  
12   video pictures, and

13          wherein said MVP is not based on a temporal interpolation of motion  
14   vectors used for encoding said second reference picture.

15  
16          43.    The method as recited in Claim 41, wherein said first reference  
17   picture, said second reference picture and said current video picture are arbitrarily  
18   temporally arranged within said sequence of video.

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20          44.    The method as recited in Claim 41, wherein said at least one other  
21   encoded portion of said current video picture is a spatially neighboring portion  
22   within said current video picture.

1           45.    The method as recited in Claim 42, wherein said at least one MVP  
2 includes at least one motion parameter to said current portion, said motion  
3 parameter based on spatial prediction using at least one collocated portion within  
4 at least one of said first and second reference pictures.

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6           46.    The method as recited in Claim 45, wherein said collocated portion  
7 is intra coded.

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9           47.    The method as recited in Claim 45, wherein said collocated portion  
10 is encoded based on a different reference picture than said corresponding portion.

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12           48.    The method as recited in Claim 45, wherein said at least one MVP is  
13 based on at least one motion parameter of at least one portion adjacent to said  
14 current portion within said current video picture.

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16           49.    The method as recited in Claim 45, wherein said MVP is used  
17 without alteration to form a prediction for at least one sample in a corresponding  
18 current video frame or a corresponding current video field.

19  
20           50.    The method as recited in Claim 45, wherein said MVP is used as a  
21 prediction to which is added a coded motion vector difference to form said  
22 prediction for at least one sample in a corresponding current video frame or a  
23 corresponding current video field.

1           51.    The method as recited in Claim 48, wherein said motion parameter  
2 includes a motion vector set to zero when said collocated portion is substantially  
3 temporally stationary.  
4

5           52.    The method as recited in Claim 51, wherein a size of said collocated  
6 portion is one unit of motion vector value.  
7

8           53.    The method as recited in Claim 52, wherein said one unit of motion  
9 vector value is one quarter-sample unit in as used in encoding said reference  
10 picture of said collocated portion.  
11

12           54.    The method as recited in Claim 45, wherein said motion parameter  
13 includes a Direct Mode motion parameter.  
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15           55.    The method as recited in Claim 41, wherein said current picture is  
16 encoded as at least one picture selected from a group of pictures comprising a B  
17 picture and a P picture.  
18

19           56.    The method as recited in Claim 42, wherein said first and second  
20 reference pictures are each encoded as P pictures.  
21

22           57.    The method as recited in Claim 41, further comprising accessing a  
23 syntax associated with said current picture, wherein said syntax identifies that said  
24 current picture was encoded using said MVP.  
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1           58.    The method as recited in Claim 41, wherein a syntax associated with  
2 said current picture includes at least one parameter selected from a group of  
3 parameters comprising a copy\_mv\_spatial parameter, a direct\_mv\_spatial  
4 parameter, and a direct\_mv\_scale\_div\_diff.

5  
6           59.    The method as recited in Claim 57, wherein said syntax includes a  
7 header selected from among a group of headers comprising a frame header, a  
8 macroblock header and a slice header.

9  
10          60.    The method as recited in Claim 59, wherein said syntax includes at  
11 least one flag indicative of a type of direct mode encoding used.

12  
13          61.    The method as recited in Claim 59, wherein said type of direct mode  
14 encoding used is selected from a group comprising temporal direct mode and  
15 spatial direct mode.

16  
17          62.    A computer-readable medium having computer-implementable  
18 instructions for causing at least one processing unit to perform acts comprising:

19                decoding at least one encoded current portion of a current video within a  
20 sequence of video pictures based on at least one motion vector predictor (MVP)  
21 associated with said current portion, said MVP comprising data associated with at  
22 least a first reference picture within said sequence of video pictures and also with  
23 at least one other encoded portion of said current video picture, and

24                wherein said MVP is not based on a temporal interpolation of motion  
25 vectors used for encoding said first reference picture.

1  
2 63. An apparatus for use in decoding video data, the apparatus  
3 comprising:

4 logic operatively configured to decode at least one encoded current portion  
5 of a current video within a sequence of video pictures based on at least one motion  
6 vector predictor (MVP) associated with said current portion, said MVP comprising  
7 data associated with at least a first reference picture within said sequence of video  
8 pictures and also with at least one other encoded portion of said current video  
9 picture, and wherein said MVP is not based on a temporal interpolation of motion  
10 vectors used for encoding said first reference picture.  
11

12 64. A computer-readable medium comprising:

13 a propagated signal carrying encoded video data that includes at least one  
14 encoded current portion of a current video within a sequence of video pictures that  
15 is encoded based on at least one motion vector predictor (MVP) associated with  
16 said current portion, said MVP comprising data associated with at least a first  
17 reference picture within said sequence of video pictures and also with at least one  
18 other encoded portion of said current video picture, and wherein said MVP is not  
19 based on a temporal interpolation of motion vectors used for encoding said first  
20 reference picture.  
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